

384-535

AU 245

47303

1973

GB 1309836

MAR 1973

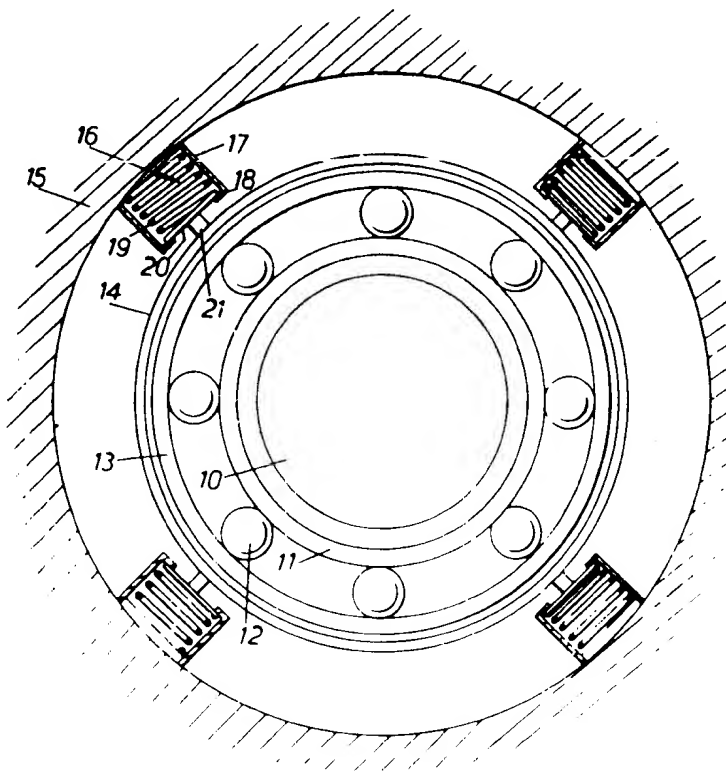
79836

COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

~~104~~
384
535



PATENT SPECIFICATION (11)

1 309 836

DRAWINGS ATTACHED

1 309 836

(21) Application No. 43923/70 (22) Filed 15 Sept. 1970

(23) Complete Specification filed 15 Sept. 1971

(44) Complete Specification published 14 March 1973

(51) International Classification F16C 27/04

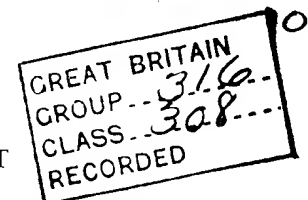
(52) Index at acceptance

F2A 7B2

F2S 9

(72) Inventors FREDERICK WILLIAM WALTON MORLEY
and KENNETH EDWARD GEORGE BRACEY

(19)



(54) A BEARING ASSEMBLY FOR A SHAFT

(71) I, THE SECRETARY OF STATE FOR DEFENCE, of Whitehall, London, S.W.1, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a bearing assembly for a shaft or like rotor.

In some cases a bearing assembly for a shaft or like rotor should be able to provide some damping of large out-of-balance forces. One example where this may be so is in the bearing for the fan of a gas turbine engine; here it is advantageous if the bearing can damp out-of-balance forces which occur when a blade or blades are lost from the fan.

The present invention provides a bearing assembly for a shaft or like rotor which provides damping of large out-of-balance forces.

According to the present invention a bearing assembly for a shaft comprises a non-rotating support member which is held in position by the plurality of springs each of which is pre-compressed and held under compression by a stop so that each spring in its rest condition is free to be further compressed by the support member but not to expand further against the support member.

Preferably said support member comprises the outer part of a hydrodynamic squeeze film bearing.

The inner part of said squeeze film bearing may support or be formed integral with the outer race of a rolling element bearing which in turn supports the shaft.

Preferably the support member comprises a ring, and said supporting springs are equi-angularly spaced around the ring.

Each said spring may be encapsulated within a cylindrical housing, the extremity of the housing nearest to the support member comprising a lip which retains a plate, the

plate acting to transfer spring forces onto the support member and to prevent further expansion of the spring.

The invention will now be particularly described merely by way of example with reference to the accompanying drawing which is a cross-section through a bearing assembly in accordance with the invention.

In the drawing 10 indicates a shaft which is a tight fit within and is supported by the inner race 11 of a ball bearing. The ball bearing comprises in a normal fashion, the inner race 11, a plurality of balls 12 and an outer race 13. The outer race 13 has its outer surface shaped to form the inner part of a hydrodynamic squeeze film bearing whose outer part is formed by a ring 14.

The ring 14 is supported from fixed structure 15 by a plurality (in this case 4) of encapsulated springs 16. Each encapsulated spring comprises a cylindrical case 17 which is retained against the fixed structure at one end and which is formed at the other end to provide an annular lip 18. A normal helical compression spring 19 is mounted within the case 17 and acts on a plate 20 which is retained by the lip 18. The plates 20 are formed with projections 21 which bear upon the ring 14, and the length of the cylindrical casings 17 and projections 21 are chosen so that in its rest position the ring 14 is a tight fit within the plurality of projections 21.

The length of the spring 19 and its spring rate are chosen so that when the springs are assembled within the casings, they are under a considerable degree of pre-compression, and it will be appreciated that the plate 20 is enabled to compress the spring further but that the lip 18 prevents the springs from further expansion.

Operation of the device is as follows. The strength of the springs 19 is chosen to be such that under normal circumstances the encapsulated springs act as if they were rigid supports for the ring 14. Should a large